Application No. 10/565,598
Amendment dated September 15, 2008
Reply to Office Action of May 13, 2008

AMENDMENTS TO CLAIMS:

1. (Currently amended) A device for controlling electromagnetic radiation emitted by a structure, the device having a first surface ~~reactive element~~ and a second reactive surface defining a cavity therebetween, the second reactive surface comprising a lattice ~~an~~ array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation, wherein ~~the~~ surface impedance of the second reactive surface ~~conductive surface~~ is reactive; and

an emitter generating electromagnetic radiation between the first surface and the second reactive surface, wherein the electromagnetic radiation within the cavity is radiated into the air through the second reactive surface.

2. (Currently amended) A device according to claim 1, wherein the dielectric surface ~~of the reactive element~~ is planar.

3. (Previously presented) A device according to claim 1, wherein the electromagnetic radiation has more than one wavelength.

4. (Previously presented) A device according to claim 1, wherein the electromagnetic radiation has more than one polarization.

5. (Currently amended) A device according to claim 1, wherein the surface impedance of the second reactive surface ~~reactive element~~ is inductive.

6. (Currently amended) A device according to claim 1, wherein the surface impedance of the second reactive surface ~~reactive element~~ is capacitive.

7. (Currently amended) A device according to claim 1, wherein the surface impedance of the second reactive surface ~~reactive element~~ is capacitive in some regions of the dielectric surface and inductive in the remaining regions of the dielectric surface.

8. (Currently amended) A device according to claim 1, wherein the magnitude of the surface impedance of the second reactive surface ~~reactive element~~ varies at different positions on the dielectric surface.

9. (Currently amended) A device according to claim 1, wherein the conductors of the second reactive surface ~~reactive element~~ are substantially periodically disposed with respect to each other on the dielectric surface.

10. (Currently amended) An antenna comprising a conductive equipotential surface; using a device for controlling electromagnetic radiation emitted by a structure, the device having a reactive element comprising a lattice ~~an~~ array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the lattice array of conductors to represent an effectively

continuous conductive surface to the electromagnetic radiation, wherein the surface impedance of the conductive surface is reactive, the reactive element of which is disposed parallel to the equipotential surface <u>to form a cavity therebetween</u>; an emitter for emitting electromagnetic radiation that is guided <u>in the cavity</u> between the equipotential surface and the reactive element; and an actuating mechanism for adjusting the displacement between the equipotential surface and the reactive element so that the angle of propagation of a beam of electromagnetic radiation that leaks through the reactive element can be varied.

11. (Original) A method of directing a beam of electromagnetic radiation using an antenna according to claim 10, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and adjusting the displacement between the equipotential surface and the reactive element using the actuating mechanism so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element is set to a predetermined value.

12. (Original) A method of scanning a beam of electromagnetic radiation using an antenna according to claim 10, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and cyclically varying the displacement between the equipotential surface and the reactive element using the actuating mechanism so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element oscillates between two values.

13. (Currently amended) An antenna for controlling electromagnetic radiation emitted comprising a conductive equipotential surface and a second reactive surface defining a cavity therebetween, the second reactive surface comprising a lattice array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation, wherein surface impedance of the second reactive surface is reactive; and

an emitter generating electromagnetic radiation between the equipotential surface and the second reactive surface, wherein the electromagnetic radiation within the cavity is radiated into the air through the second reactive surface ~~using a device according to claim 1~~, wherein the second reactive surface ~~reactive element~~ of which is disposed parallel to the equipotential surface; the ~~an~~ emitter emits ~~for emitting~~ electromagnetic radiation that is guided between the equipotential surface and the second reactive surface~~reactive element~~; and a layer of active dielectric material disposed between the equipotential surface and the second reactive surface ~~reactive element~~ wherein the angle of propagation of a beam of electromagnetic radiation that leaks through the second reactive surface ~~reactive element~~ can be varied by adjusting a biasing potential across the layer of active dielectric material.

14. (Currently amended) An antenna according to claim 13, further comprising an actuating mechanism for adjusting the displacement between the equipotential surface and the second reactive surface ~~reactive element~~ so that the angle of propagation of the beam of electromagnetic radiation that leaks through the second reactive surface ~~reactive element~~ can be varied.

15. (Previously presented) An antenna according to claim 14 wherein the actuating mechanism comprises a hydraulic actuator or a piezoelectric actuator, or an electric motor.

16. (Currently amended) An antenna according to claim 13 ~~10~~, wherein the emitter is a dual polarization collimated source or is a dual polarized planar feed or a conformal array feed.

17. (Previously presented) An antenna according to claim 13, wherein the active dielectric material is titanium dioxide.

18. (Currently amended) A method of directing a beam of electromagnetic radiation using an antenna according to claim 13, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the second reactive surface~~reactive element~~; and adjusting the biasing potential across the equipotential surface and the second reactive surface ~~reactive element~~ so that the angle of propagation of the beam of electromagnetic radiation that leaks through the second reactive surface ~~reactive element~~ is set to a predetermined value.

19. (Currently amended) A method of scanning a beam of electromagnetic radiation using an antenna according to claim 13, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the second reactive surface ~~reactive element~~; and cyclically varying the biasing potential across the equipotential surface and the reactive element so that the angle of propagation of the beam of electromagnetic radiation that leaks through the second reactive surface ~~reactive element~~ oscillates between two values.

20. (Canceled)

21. (Currently amended) A device ~~An antenna~~ according to claim 1~~20~~, wherein the first surface ~~a boundary of the cavity opposite the reactive element of the first device~~ is an equipotential surface.

22. (Currently amended) A device ~~An antenna~~ according to claim 21~~20~~, wherein the first surface ~~a boundary of the cavity opposite the reactive element of the reactive element comprises a second device, the reactive element of which is adapted to present~~ presents a capacitive surface impedance.

23. (Currently amended) A device ~~An antenna~~ according to claim 1 ~~20~~, wherein the cavity is formed using a printed circuit board substrate with the second reactive surface ~~reactive element~~ being printed on a top layer of the substrate and plated through holes connecting a ~~the~~ top layer to a ~~the~~ bottom layer which forms the first surface as an opposite boundary, the plated through holes thereby forming ~~the~~ sides of the cavity.

24. (Currently amended) A device ~~An antenna~~ according to claim 23, wherein the emitter is printed on an inner layer of a substrate.

25. (Canceled)